

Remarks

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1-3, 9 and 23 are now pending in the application, with Claim 1 being independent. Claims 5, 6, 13 and 16 have been cancelled without prejudice. Claims 1 and 2 have been amended and Claim 23 has been added herein. New Claim 23 is based on original Claim 11, which had been cancelled.

Initially, Applicants' undersigned representative wishes to thank the Examiner for the courtesies extended during the telephonic interview of March 29, 2004. During that interview, proposed changes to Claim 1 were discussed. Those proposed changes have been incorporated herein.

Applicants note with appreciation the indication that Claim 2 recites allowable subject matter. This claim was objected to for being dependent upon a rejected base claim. As discussed during the interview, Applicants have amended independent Claim 1 to include at least one of the features from Claim 2 that the Examiner considered allowable. In particular, Claim 1 now recites that the refractive index anisotropy of a liquid crystal composition having said nematic liquid crystal as the primary component thereof at 30°C is 0.150 or more. Claim 1 is believed to be allowable for the recitation of this feature as well as for the reasons discussed below.

Claims 1, 3, 5, 6, 9, 13 and 16 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,141,070 (Kaneko) in view of U.S. Patent No. 6,111,059 (Nihira et al.). This rejection is respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a liquid crystal device including an upper substrate and a lower substrate, and nematic liquid crystal sandwiched between the upper and lower substrates. A direction of uniaxial orientation of liquid crystal molecules on rubbing alignment layers formed on upper and lower substrates is parallel so that a bend orientation is formed. The refractive index anisotropy of a liquid crystal composition having the nematic liquid crystal as the primary component thereof at 30°C is 0.150 or more. A change of a retardation value of the liquid crystal device due to a temperature change of the liquid crystal composition is reduced by changing a pre-tilt angle of the liquid crystal device so as to change the orientation state of the liquid crystal molecules between the upper and lower substrates.

Also during the interview, the Examiner questioned whether a nematic crystal was compatible with a bend orientation type liquid crystal device. The Examiner pointed to the original disclosure at pages 7 and 8 where it is stated, in part, that “the present embodiment is not applied to TN liquid crystal devices.” However, although the specification states at page 8 that that particular embodiment is not compatible with twisted nematic (TN) oriented devices, this does not preclude the use of nematic liquid crystal in a device with bend orientation. For example, the Examiner’s attention is directed to page 2, lines 12-14, where a “bend orientation type nematic liquid crystal” is discussed. Favorable consideration is requested.

Applicants will now discuss the advantages of the claimed invention. As shown in Applicants’ Fig. 1, in the bend orientation, liquid crystal molecules are tilted near the top and bottom substrates and are almost perpendicular to the substrates at the middle

of the gap. The tilt angle near the substrates, i.e., the pre-tilt angle, is dominant to the retardation value R. The retardation value R varies remarkably by variation of the pre-tilt angle.

Contrary to the bend orientation, in the twist orientation as exemplified by Kaneko and in the splay orientation, the main contribution to the retardation value comes from molecules at the middle of the gap. Here, the pre-tilt angle does not significantly affect the retardation value.

Accordingly, the bend orientation is important to the present invention, where the retardation change due to temperature variation of optical anisotropy of liquid crystal molecules can be compensated by the pre-tilt angle change. Such results in a unique and unexpected advantage.

Accordingly, in addition to failing to disclose or suggest the added feature from Claim 2, Kaneko is not believed to disclose or suggest that a direction of uniaxial orientation of liquid crystal molecules on rubbing alignment layers formed on upper and lower substrates is parallel so that a bend orientation is formed, wherein a change of a retardation value of the liquid crystal device due to a temperature change of the liquid crystal composition is reduced by changing a pre-tilt angle of the liquid crystal device so as to change the orientation state of liquid crystal molecules between the upper and lower substrates, as is recited in independent Claim 1.

Thus, Kaneko fails to disclose or suggest important features of the present invention recited in independent Claim 1.

Nihira et al. has also been reviewed, but is not believed to remedy the deficiencies of Kaneko noted above with respect to independent Claim 1.

Thus, independent Claim 1 is patentable over the citations of record.

Reconsideration and withdrawal of the § 103 rejection are respectfully requested.

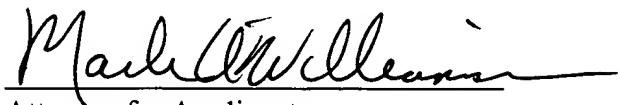
For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claim 1. Dependent Claims 2, 3, 9 and 23 are also allowable, in their own right, for defining features of the present invention in addition to those recited in independent Claim 1. Individual consideration of the dependent claims is requested.

This Amendment After Final Rejection does not raise significant new issues, is an earnest attempt to advance prosecution and reduce the number of issues, and is believed to clearly place this application in condition for allowance. This Amendment was not earlier presented because Applicants earnestly believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of this Amendment under 37 CFR 1.116 is respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action, and an early Notice of Allowability are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

  
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Attorney for Applicants

Registration No. 33,628

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile: (212) 218-2200

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